

The Destruction of *Piroplasma canis* by the Neutrophiles and Large Mononuclear Leucocytes.

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INTRODUCTION.

THE pathological changes observed in piroplasma infection in dogs depend on a number of factors such as the breed, age, general condition of the host, intensity of the infection and duration of the disease. The biliary fever parasites live and feed at the expense of the erythrocytes of which large numbers are destroyed. The anaemia that develops is not only due to a purely mechanical destruction of the cells, but possibly also due to a toxin that is liberated by the parasites. Toxins have not yet been demonstrated experimentally, but it has been observed that in chronic piroplasmosis where parasites are rare the anaemia may be marked. Such animals respond to treatment and the blood picture then returns to normal.

Another change observed in the blood is the leucocytosis. Nocard and Motas (1902) state that the leucocytosis is chiefly due to an increase in the large mononuclear and the polynuclear elements. The former phagocytose both erythrocytes and parasites. Phagocytosis occurs in the peripheral blood but is more marked in the spleen. Similar observations are recorded by Christophers (1907), Nuttall and Graham-Smith (1905) and Schuberg and Reichenow (1912).

Studies on the distribution of the parasites in the host were made by Kinoshita (1907) and Schuberg and Reichenow (1912). They found that most of the parasites are present in the capillaries of the skin and internal organs. A smear prepared from the first drop of blood that exudes from a small cut on the ear harbours many parasites, whereas already in the second drop great difficulty may be experienced in demonstrating the infection.

PERSONAL OBSERVATIONS.

In November, 1936, a Doberman Pinscher which had been suffering for several days from an acute attack of biliary fever was brought from a neighbouring farm to Onderstepoort for treatment.

The dog was injected with the recommended dose of acaprin, but six days later the owner reported that the dog died after showing convulsions.

A smear prepared at the time of treatment from the peripheral blood of the ear showed an interesting blood picture. The anaemic changes were advanced. Polychromasia, anisocytosis, Jolly bodies and normoblasts were a prominent feature. The differential count made from the peripheral blood was: Lymphocytes 22 per cent., large mononuclears 20 per cent., eosinophiles 1 per cent., basophiles 1 per cent., neutrophiles 56 per cent.

In the appended table the distribution of the parasites in the blood cells is given. A fair number of intracellular parasites was observed. On examining the leucocytes it was noticed that apart from the large mononuclears the neutrophiles were also actively engaged in destroying *P. canis*. The monocytes ingested both erythrocytes and parasites whereas the neutrophiles contained only the latter. The phagocytosed parasites showed various stages of degeneration. In some the cytoplasm was partially digested and in others only a disintegrated nucleus was visible.

The Distribution of Piroplasma canis in the Various Blood Cells.

Blood Cell.	Number counted.	Number containing parasites.	REMARKS.
Erythrocyte.....	1,000	56	Erythrocytes on an average contained 1 or 2 parasites. In some cells up to 8 parasites were seen. Extracellular forms were also present.
Large Mono-nuclears	1,000	148	The mononuclears harboured erythrocytes or parasites, but frequently both were present. 65% of the mononuclears contained 1 parasite. 15% of the mononuclears contained 2 parasites 11% of the mononuclears contained 3 parasites 7% of the mononuclears contained 4 parasites 1% of the mononuclears contained 5 parasites 1% of the mononuclears contained 8 parasites
Neutrophiles.....	1,000	90	Approximately 30% of the neutrophiles were band forms. Approximately 70% of the neutrophiles were segmented forms. 68% of the neutrophiles contained 1 parasite. 22% of the neutrophiles contained 2 parasites. 6% of the neutrophiles contained 3 parasites. 2% of the neutrophiles contained 4 parasites. 1% of the neutrophiles contained 5 parasites. 0.5% of the neutrophiles contained 6 parasites. 0.5% of the neutrophiles contained 7 parasites.

From this observation it would appear that the neutrophiles do not attack parasitized erythrocytes but only phagocytose the free parasites. Similar observations are recorded in malaria of human beings by Neumann and Mayer (1914) and Thomson and Robertson (1929), where the neutrophiles may harbour numerous parasites and pigment. Some authors (Hirschfeld and Sumi, 1925) state that the neutrophiles are also associated with erythrophagocytosis but De Kock and Quinlan (1926) were not able to demonstrate this phenomenon.

SUMMARY.

A case of biliary fever in a dog is reported on where *P. canis* is phagocytosed by the large mononuclear leucocytes and the neutrophiles. In contradistinction to the activity of the mononuclears which ingest the parasites and their host cells the neutrophiles are only concerned with the destruction of the extracellular parasites.

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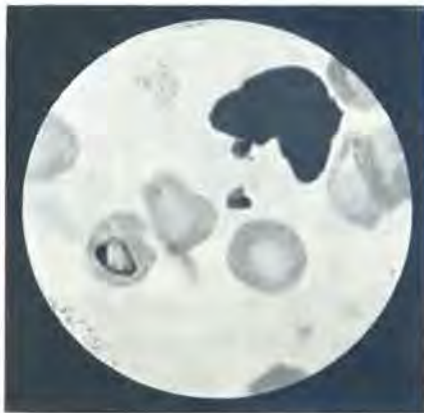


Fig. 1.—Neutrophile with 2 phagocytosed parasites (*P. canis*).

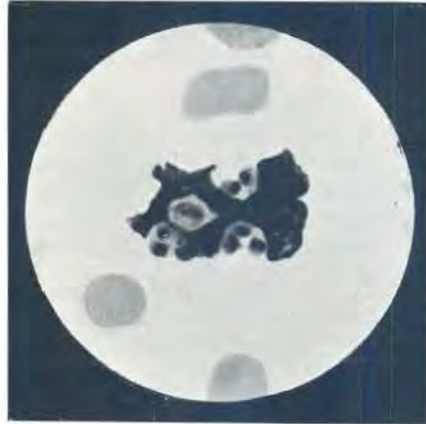


Fig. 2.—Neutrophile with 8 phagocytosed parasites (*P. canis*).



Fig. 3.—Large mononuclear leucocyte with 4 phagocytosed parasites. In one parasite the cytoplasm has been completely destroyed and only the nucleus is visible. (*P. canis*.)